App. F. IX-4

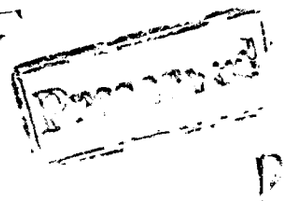
Previous References 192[illegible] ([illegible])

File No. 38-29

Serial Nos. 1, 4

Sericulture

Later References



General and Revenue Secretariat.

Serial Nos. Two

Part B for November 1928.

SUBJECT

Report Submitted by Mr K. Shamsuddin Khan, Assistant Superintendent of Sericulture (on deputation) of work done by him.

8(4) To the Director of I.t.c
No D 5267 dt 21/11/28

Makes certain observations and expresses that a beginning should be made in research work in Sericulture on certain lines, which may be taken up by Mr Shamsuddin when on his return.

W.A. Mackenzie
Director
4/12/28

TELEGRAPHIC ADDRESS:—"INDUSCOM."

In reply please refer to No. D4-2359/27-28

GOVERNMENT OF MYSORE.

DEPARTMENT OF INDUSTRIES AND COMMERCE.

OFFICE OF THE DIRECTOR,

Dated, Bangalore, 24th Septr ..... *19*29.

FROM

C. RANGANATHA RAO SAHIB, Esq., B.A., B.L.,
Director of Industries and Commerce in Mysore,
(Bangalore, India.)

To

N. Rama Rao, Esq., B.A., B.L.,
Secretary to the Government of Mysore,
Development Departments, Bangalore.

SIR,

Dev. 38-29-1

I have the honor to forward herewith copy of a very interesting report submitted by Mr. K. Shamsuddin Khan on the work done by him during the 4th Quarter ending the 15th May 1929. The report gives a brief result of his study on Silk Worm genetics and the Chemical work done by him. It is interesting to hear that Silk Waste has been used as a material for the manufacture of artificial silk. He will be instructed to make confidential enquiries in regard to the processes employed. The Superintendent of Sericulture will also be requested to try the method of grafting mulberry referred to in the report.

I am of opinion that all the reports submitted by Mr. Shamsuddin Khan may be printed for future use. I request the early sanction of Government in the matter.

I have the honor to be,
Sir,
Your most obedient servant,
C. Ranganatha Rao Sahib
Director.

The report is very interesting.
All Mr S. Khan's reports may be collected & printed in Oct. Size

26/9/29

1st Member

The report is really very interesting. Some parts of it are however too technical for me. I am very glad to learn that Mr S has learnt Japanese language. We should get Japan's Sericulture literature & journals & profit from them. The reeling & cultivation improvements mentioned

FIRST
28 OCT. 1929
No. 2807

2853

May 25/29

by Mr S requires should be
Prof. by us Mr S's
report may be printed
but it would perhaps be
wise to wait until
the return of Capt Imperiale
the printing Work
that Waste Silk is used in
artificial Silk is
interesting information
one point which is
much enquired on
by my mind on reading
Mr S's report
the great scientific
Work which is being
done in Japan to
develop Sericulture
Now - I would
Your Re the necessity
to Consider if it
to not time for us
start research
Scientific investigation
Work for
our local problems
Research Work in all
to Provincial
to should make a
serious beginning

Some of the principal lines of study & enquiry

A We may ask
Re Dr to
have these problems
taken up
investigation -
Mr Shamshuddin Khan
during his return to
our Institute to
Two very promising lines of research work
may be pursued with advantage
(1) evolving different hybrids
from different races (in Japan
the varying conditions of humidity
temperature)
(2) Seeing whether in the
recessive of a foreign race (Cam-
voltine or original) the multivoltine
nature of the local race does not
"cross over". I thought
this was the explana-
tion of Mr Richardson
30.9.29 Ch 4, which was
become multivoltine;
has asked Mr S Khan to
this hypothesis by expt
Mr work has been discontinued
1st Member

Mr Richardson 28.10.29

Serial No.

Subd with a draft
K.B. 7.11.29.

der dem for appr
Eng 9/11/29

Issue
9/11
9/11/29
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29/11

4. D.5267/ dated 21/11/29

To The Director etc.

Makes certain observations and expresses that a beginning should be made in research work in Sericulture on certain lines, which may be taken up by Mr. Shamshuddin Khan on his return.

29 NOV 29

WD 01684—GPB—30,000—20-4-29

Letter No. 18 dated 24-5-1929 from Mr. K. Shamsuddin Khan, B.A., Asst. Superintendent of Sericulture (on deputation), C/O The Indo-Japanese Association, Tokyo, Japan, to the Superintendent of Sericulture in Mysore, Mysore.

I submit herewith a brief report of work done by me for the quarter ending with the 15th May 1929 for favour of information. I have moved to Kumagaya to work in the Experimental Station with a view to study the spring, summer, and autumn crops in the Station and to study in detail the methods adopted by the rearers, mulberry cultivation in general, manufacture of egg cards, organisation of grainages and of Cooperative Societies, technical education to raiyats' sons in sericulture and also general economic conditions, cocoon markets, and filature industry.

With regards,

****

A brief report of work done during the 4th Quarter ending with the 15th May 1929.

During this quarter I worked in the pathological and chemical laboratories of the Tokyo Higher Sericultural College and also in Filature and in Moriculture Section.

Work in Pathological and Genetical Laboratory:- I completed my work on flacherie and grasserie. I have stated all about flacherie in my last report. I may, however, add that flacherie is primarily a disease caused by physiological disturbances and Bacteria are merely secondary cause. Bacillus Sotto is certainly not the cause of flacherie. We find Bacteria of Megatherium Group, of Coli Group, of diflococcus group in flacherie worms. It is the disturbance of P.H. Value in the stomach that is the essential cause of flacherie. This is brought about by bad seed, high temperature, bad leaf, low and high humidity, and bad ventilation in rearing houses. The preventive measures are based upon elimination of the above factors.

Grasserie:- The theory regarding Grasserie is that it is caused by a Protozoan belonging to the group Chlamydozoa which are questionable Protozoa. These protozoa attack the blood tissue, muscle fibres, nerve, and in fact every tissue and precipitate

albumen

Albumen Crystals which is the cause of swelling and milkiness. I carried on the research by injection methods and subsequent microtome sections and microscopic examination of slides with reference to the cause and development of the disease in cells and in tissues.

I made a study of Fungi to enable me to understand diseases of mulberry and carried on practical work connected with Fungi, viz. microscopic study of Fungi and their organisation, etc. A note in detail was prepared on Mildew of Mulberry and submitted to the Superintendent of Sericulture, giving in detail the pathological side of the disease and the results of experiments carried on in Japan and the remedial measures adopted.

I carried on photo-micrographic work and completed its practical study and several good photographs of minute structures of Bacteria, etc. were successfully exposed, developed and printed. A photograph of Bucillus Sotto shewing the minute Cilia is enclosed along with this. (Magnification oil immersion x 2500 diameters.)

A number of bulletins pertaining to pathology of silk worms published by the Imperial Experimental Station were studied with the aid of Prof. T. Tateiwa. Besides I made a detailed study of 'Immunity' and 'Phagocytosis'and carried on practical research work in 'Phagocytosis' in insects. The insects chosen were Galleria. Galleria has the same blood corpuscles as silkworm, viz. pro-Lenkocytes, Lenkocytes, Oenocytes, and spherical cells. Lencocytes are the only cells that absorb or adsorb bacteria and fight against diseases. The views regarding this are that adsorption takes place due to 'surface tension' and to mechanical ingestion. The method in investigation employed was to inject Strepto Blanc (dilute solution 1/80 C.C.) by means of the glass pippet-needle between the 4th and 5th abdominal segments above the stigenata and to examine blood smears stained after regular intervals of 15', 30', 45', 45', 1 hr., etc. The several dozens of preparations made indicated that before one hour after injection Phagocytosis was complete and no bacteria

were

were to be found.

I made a detailed study of silk-worm Genetics and I give below in brief the essential features and characters relating to it as per work done up to date in Japan.

I. Egg Characters:-

(1) Shape. - In Japan there are two shapes, viz. Normal and Spindle. Inheritence is psue-do-maternal.

A. Spindle ♀ x Normal ♂.

F_1. All spindle (Embryo is the result of fertilisation)

F_2. All normal. (Shell is maternal and hence the psue-do-character.)

F_3. Normal 3. Spindle 1.

B. Spindle ♂ x Normal ♀.

F_1. All Normal.

F_2. All Normal.

F_3. Normal 3. Spindle 1.

(2)Colour of eggs:- This is caused by the colour of the shell. Normal colour of Aminon in Japanese varieties is purple to blue. It is psuedo-maternal in inheritance. Yellow green colour is caused by shell and is psuedo-maternal in inheritance. Colour of the Yolk is deep yellow in yellow cocoons spinning races and high yellow in white cocoon spinning races.

Deep Yellow ♀ x Light Yellow ♂.

F_1. Deep Yellow (embryo is F_1 and Yolk is maternal.)

F_2. Deep yellow 3. Light yellow 1. This again is a case of psuedo-maternal inheritance.

(N.B. - Low temperature changes colour of aminon. It is perhaps due to this fact that in winter in Mysore colour of eggs changes.)

Red Colour:- Is obtainable in Chinese Races. The colour is of amnion. Inheritance is normal. Grey colour is dominant to Red colour.

(a) Brown ♀ x Normal ♂.

F_1. All Brown.

F_2. All Normal. (Normal is dominant.) Normal 3. Brown 1.

(b) Normal ♀ x Brown ♂.

F_1. All Normal.

F_2. Normal. Normal 3. Brown 1.

Inheritance is maternal.

Brown colour of amnion is colour, and therefore a product of fertilisation

Green

Green colour is also amnion colour and inheritance is maternal as in grey and brown. Indigo colour is similar in character.

(3) Gummy character of eggs:-

Gumminess is of two kinds, viz., strongly gummy (e.g. Italian, French, Japanese, and Mysore,)
Less Gummy. (e.g. Baghadad.)

Inheritance is psuedo-maternal. Strong Gummy character is recessive. F_2 has less gumminess and in F3 the proportion is 3 : 1 for less gummy and strongly gummy characters.

II. Voltinism:- Inheritance in univoltines, bivoltines, and tetravoltines is maternal. univoltinism is dominant to bivoltinism and tetravoltinisn and bivoltinism is dominant to tetravoltinisam. Voltinism changes colour by temperature as chromosomes are affected by temperature. Bivoltines incubated at 25°C. become univoltines and these incubated at 15°C. are always bivoltines. Those incubated between 15°C to 25°C some become bivoltines and some univoltines.

III. Markings:- These are classified into three, viz., fundamental, accessory, and combined. In fundamental are grouped striped, striped quail, Mericaud, Mericaud Quail, Normal, Plain, Quail, and Pale Quail. Pale and Quail are due to one gene factor, the other five are due to two or more factors or Genes.

In accessory markings are grouped, Zebra, Multilunar, and Multilunar Zebra. These do not exist independently but are only accessory. Zebra and multilunar are one factor while multilunar Zebra is due to two factors.

Combined markings go in combination with the fundamental and accessory markings. There are altogether 32 in this. There are according to Tanaka 128 combinations.

Inheritance:- Striped is the strongest dominant factor. The gene of striped has linkage with quail factor, i.e., they are on the same chromosome. Striped marking has linkage with yellow blood and with colour determiner. The cross-ever valve is uncertainly known. But quail factor and striped marking have complete tin kage.

Moricaud is next in dominance to striped. This is linked with quail completely and with striped and is linked with yellow blood.

factor

Striped Quail. If factor of plain is added to striped Quail marking changes to striped. Relation of blood is the same as to striped marking.

Moricand Quail:- If plain factor is added to it the marking changes to Moricand. The relation to blood is the same as in Moricand.

Normal Marking:- This is developed by two factors, viz. Quail and normal factors. This factor is recessive to striped and Moricand, because component factors are recessive to the striped and Quail ones. This is linked with yellow blood.

Plain x Quail
ppqq. 1 ppQQ.
F_1. Normal (PpQq)
F_2.

Normal 9.	Quail 3.	Plain 3.	Pale Quail 1.

Plain:- If combined with Quail it gives Normal markings. This factor is dominant to Pale Quail. To others it is recessive. It is linked with yellow blood factor.

Pail Quail:- This is absolutely recessive to others. This is not linked with yellow blood.

There may be more linked factors besides yellow blood, but research is necessary to determine them fully.

Accessory Markings:- Zebra. The Zebra factor has not dominance to others. It has no recessiveness. It develops in combination to the same extent.

2. Multilunar behaves like Zebra, but when combined with plain it gives light-colour.

3. Multilunar Zebra is the same as the above.

A special case is that of 'oily' skin. It is always recessive to the normal skin. But 'Oily' (French) has "Sex linked" character.

♀ Normal x Oily ♂.
F_1. Oily ♀ x ♂ Normal.
F_2. Normal. Oily. 1 1 1 1
♀ ♂ ♀ ♂

Oily ♀ x Normal ♂.
F_1. Normal.
F_2. Normal. Oily. 1 1
"All Oily."

N - Nominal Factor, n - Oily factor, N & n Exist in the same chromosome

chromosome, i.e., X Chromosome and not Y Chromosome.

IV. Knobs on Body:- This is dominant to Normal. It has Mendilian heridity.

V. Eye-Character:- (In the worms it is single and in the moth compound.)

1. Normal Colour. - Black. Is most dominant.
2. White. - Recessive (of worms and moths comes from white eggs.)
3. Red. - This is secured in dominance and comes from red eggs.

(N.B. - Albinos. Egss white, cocoons white, worms plane, and moth is white. In albino the colour or white eye is the important factor.)

VI. Moulting:- This is not definitely determined. Generally 3 moulting is dominant to 4 moulting. This character is complicated and is irregular in inheritance.

VII. Cocoons:- Colour is of two factors, viz. 1. Yellow blood factor.
2. Colour determining factor, called Special Factor.

(C - Blood Factor, Y- Colour determining factor.)

Y factor alone cannot produce yellow cocoons.

C - do - - do -

A recent discovery has been made in Japan that there are worms with yellow blood which spin white cocoons.

C plus Y - Yellow cocoons.

(Cocoons) Pure White x Pure White cocoons.
CCYY x ccyy.
(Yellow Blood) 1 (White Blood.)
F_1CcYy Yellow Blood and Yellow cocoons.

In F_2.

(a) $CCYY_1$. $CCYy_2$, $CcYy_2$, $CcYy_4$. - 9 yellow cocoons and yellow blood.

(b) $ccyy_1$, $ccyy_2$, ccyy. - 4 white cocoons and white blood.

(c) $CCYY_1$, Ccyy. - 3 Yellow blood and white cocoons.

(This work was done by Prof. Uda of Miye Agricultural College.)

There are thus Yellow blood - yellow cocoons, yellow blood - white cocoons, white blood - white cocoons, but white blood - yellow cocoons are not found. There is no cross-over valve. It may be assumed that there is completely linkage.

It may be that white dominant cocoon is due to Inhilitory Factor

Factor, e.g., 'Bagdad', Blanc Pays, Blanc Pure. The formulae for all these are too elaborate to be mentioned in a report of this nature. || green cocoons: this belongs to 'multiple' factors. At least three factors go to make up green cocoons viz: G_1, G_2, & G_3,.

Green Cocoons x White cocoons.

$(G_1\ G_2\ G_3)$ $(g_1\ g_2\ g_3)$

P. $G_1\ G_1$, $G_2\ G_2$, $G_3\ G_3$. x $g_1\ g_1$, $g_2\ g_2$, $g_3\ g_3$.

$\Downarrow$

F_1 All Green.

F_2 63 green, 1 white (Trihybrid Rato.)

Due to three ~~of~~ or more factors we always get intermediate grades.

Rose. - This is also due to multiple factors. It is dominant to white and to yellow. The incidence of colour is complicated.

Forms of cocoons:- Size of cocoons; surface character; floss, Quantity of silk; length of filament, Denier belong to incidence of multiple factors. Therefore behaviour is irregular. (Full experiments are wanting.)

Double cocoons:- This characteristic depends upon ~~xxxxxxxxxx~~ environment. It is also a racial characteristic. It is hereditory to <u>race</u> but not to <u>individual</u>. There is no Mendelian inheritance in 'Double Cocoons'. But double cocoons <u>should be</u> rejected in grainages as pupae are small and are consequently not suitable for seed purposes.

Denier:- This belongs perhaps to 'multiple' factors, but there are no full and exact experiments.

Marking of moths:- Dark colour marking is always dominant to light colour marking.

Inheritance of the compound eye of the moth is the same as the inheritance of the single eye of the silk-worm and also the inheritance of knob on the thorax of the moth. (To produce permanent improvements in breeding it is absolutely necessary to get pure lines first and cross for certain selected and known -- characters.)

In Japan the most popular univoltines are Akajuku, Aojuku, Matamukashi. Their F_1s are prepared by crossing with Chinese and

European

European races by merchant seed manufacturers, but original races are reared by Experimental Stations and selection of suitable races for each locality is done by Experimental Stations.

So far only one case of sex-linked mutation has been found in Japan but is too elaborate for mention in this report.

Professor T. Taeiwa delivered special lectures to me in physiology of silk-worm. Almost half of the draft translation of Anotomy of silk-worm was completed and draft translation of the General Sericultural Policy in Japan was almost completed. with this my work in Bacteriological, pathological & Genetical laboratories of this College finished.

Chemical work. - I made theoretical studies of artificial silk and its manufacture and the several methods employed in Germany, France, Switzerland, America, England, and Japan. In this connection it is interesting to report that the experiments that were being carried in Japan (in the Imperial Agricultural College) to manufacture artificial silk by employing silk-waste as 'basic' material have been very successful. Very soon they hope to be able to employ this method in Industrial concerns. The processes are a secret of Japan Government. In Japan they hope to benefit considerably by this invention as all silk-waste would be consumed in artificial silk plant and would be a support to the industry in general.

I always thought that an art. silk resembling natural silk could be produced using waste silk linters by cellulose. I had of course no opportunity of testing this theory. The costly art. silk so made will however prevent it from competing with natural silk fabrics.

I studied Agricultural Chemistry, soils, and manures in the Chemical Department . For nearly five weeks I was engaged in Chemical alanysis of mulberry leaf, soils, and manures. I did mechanical analysis of soils as well. I give below the average of results of my chemical analysis of mulberry leaf (of Ichibei - a variety commonly (of air dry matter) used in Tohoku Province in Japan.)

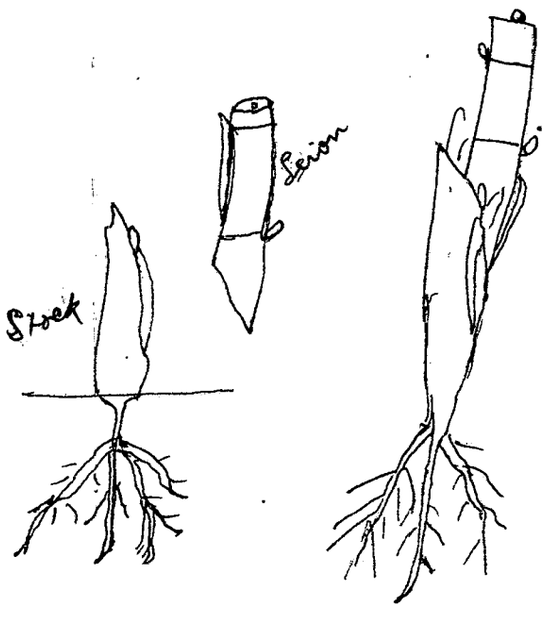
Moisture.	- 11.4 %.
Organic matter.-	
Ashes.	- 9.2 %.
Total Nitrogen.-	4.2812 %.
Protein Nitrogen.-	3.058 %.
Crude Fibre.	- 8.1.%.
Ether extracted matter.	- 5.4 %.
Carbohydrate.	- 40.0 %.

Filature:- In the filature I completed my study of cooking methods, cooking machinery, of drying and conditioning (cocoon) chambers of which I furnished a description in my previous report.

My

My further work in cooking confirms my view that in Japan wastage is largely prevented by combined cooking in filatures and doing it methodically either in hand pans or in special cooking apparatus. Since the filature was closed for the annual vacation on account of examinations I ended my work in the middle of March which will again be taken up after my work in Kumagaya.

Mulberry Section:- I attended to practical work in garden in transplanting seedlings of last year's graft and to pruning of plants by the various methods and to practical work in grafting. In grafting success depends upon the suitable varieties selected for stock and Scion and the method in grafting mulberry is 'Kiritsugi' or 'cutting grafting'. The stock is generally one to two years old and the Scion is above five years of age. After selecting the suitable thickness of individual stocks and scions the grafting is done as indicated in the figures.



The Scion has two or three buds only. The Scion and stock are hid together by means of paddy straw. The points to be noted are the ages of the stock and Scion, the clean cut and jointing together of Scion and Stock, and the shortness of the stock (which is only about 4" to 5" in height). The operations should be carried removing the stock from its holding in the soil and it should be replanted in a new place and should be allowed to develop there one full year, before attending to subsequent operations. I think this method will do well in Mysore.

I visited a silk dyeing factory in Yokohama and studied the processes employed in dyeing silk piece goods.

In

In conclusion I beg to add that it is one year since I joined Koto Sanshi Gakko, Tokyo and I have done work in this College, connected with rearing of spring, summer and autumn crops and followed the various genetical experiments that were conducted in the genetic: department. The characteristics of various breeds with special reference to suitability to seasonal variations were studied. I visited a number of institutions and filatures and studied their organisation and the work they do. I carried on research work in 'Chromosomes', flacherie, grasserie, and muscardine, phagocytosis, etc. besides having studied anatomy, physiology, genetics and pathology of silk-worms. In filature I studied the various types of machinery in use in Japan, the various cooking machinery and conditioning (cocoon) chambers. I carried several experiments in cooking of cocoons and attended to practical reeling work. I did besides general bactereological work. I made a study of mulberry cultivatio: both theory and practices. Several filatures were studied and their characteristics and specialities were studied. In chemical department I made a study of artificial silk and its manufacture (theory only) and studied agricultural chemistry and oid analysis works of mulberry leaf, soils and manures.

Besides I have been translating a standard book and a note on general sericultural policy in Japan and have dome about half in each. General literature connected with sericultural science was studied. Last but not the least I acquired a working knowledge of Japanese language (speaking.)

I came over to Kumagaya on the 21st instant to take up study of the next item on the programme of my work here and I hope to be able to gather much practical information during my stay here.

Sd/- K. Shamsuddin Khan,
Asst. Supdt. of Sericulture on deputation in Japan.

Kumagaya,
(Saitamaken) Japan,
24th May 1929.

662
1-8-29

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Copy submitted to the Director of Industries and Commerce in Mysore, Bangalore, for favour of information.

Superintendent of Sericulture.

TR.

Ky
3477/29

Appendix F G—1

SUBJECT.....

.....

.....

Section Seri

File No. 38-29

Serial No. 4.

No. D 5267

Diary No. of letter replied to.....

General and Revenue Secretariat

( )

the *192*

To

The Wir. of P.

Date of issue 21/ 11/ 29

Signed by W.F.S. Sahib

Sir,

With reference to your letter no. D/-2305/27 dated 24th Sept. 1929 submitting a report of work done by Mr. K. S Khan during the 4th quarter ending 15th March 1929, I am directed to state that Govt. have read the report with much interest. ~~am about to state as follows:~~

List of enclosures.....

Copied by.....

Examined by.....

over

WD 063—GPB—20,000—1-8-29

~~Govt. with have no objection~~
consider it desirable that the Sericultural Dept should
~~to Japan~~ that ~~project~~ Japan's
Sericultural literature and
journals and profit by them
~~for the Ser. Dept and profit from them.~~
The reeling and cultivation
improvements mentioned by Mr.
S. Shamsuddin be tried by the Dept.
Mr. Shamsuddin's reports
may all be printed after his
return, the printing work being
supervised by him.

Govt. also consider it highly
time that research work was
undertaken to develop Seri-
culture, as is being done in Japan
and elsewhere and desire that
a beginning might be made to
investigate the two very promising
lines of work - viz.

(a) evolving different hybrids
for different Seasons in
Mysore (to suit the varying
Conditions of humidity and
temperature).

(b) Seeing whether in the

G. R. S. App F. G. 3.

GENERAL AND REVENUE SECRETARIAT.

(Continuation sheet draft form.)

course of ~~hybridisation~~ experiment. continued cross breeding between a univoltine foreign race with the impure multivoltine ~~recessive~~ of a foreign ~~race~~, the multivoltine character ~~nature~~ of the local race does not "cross over", and if so, whether it is not possible to evolve a working formula as to when and under what conditions this crossing over takes place. The practical value of such a formula is obvious. The history of C_4 (which is ~~probably~~ possibly the ~~Japanese~~ Nichi 106 with multivoltinism crossing over) is an instance in point.

W. S. khan may be asked on his return to take up the above and other promising lines of research work.

Thanks yr

19/11/29

by Dev Seth

WD 0327—GPB—10,000—18-5-27